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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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EXAMINER

ART UNIT	PAPER NUMBER
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DATE MAILED:

21

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/045 507

Applicant(s)

MACINTYRE DONALD
MALCOLM
Art Unit

Examiner

Douglas A Wille

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 10 October 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

15) ☐ Notice of References Cited (PTO-894)

16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)

17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s)

18) ☐ Notice of Informal Patent Application (PTO-151)

19) ☐ Notice of Informal Patent Application (PTO-151)

20) ☐ Other

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 18 – 24, 30, 31 and 32-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Correction is required.
3. Claim 18, last line, refers to the conductive material. Which conductive material is this?
4. Claim 30 refers to the second conductive layer when, apparently the second layer of conductive material is meant. Claim 31 has the same problem.
5. Claim 32, second paragraph from the last and the last line of the claim refer to the conductive material.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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8. Claims 18 – 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kata et al. in view of Lin, Tsukamoto and Igarashi et al.

9. Kata et al. show the wafer scale device (see Figures 3 and 4 and column 6, line 36 et seq.) where the wafer is connected through film 64 to bumps 70. Lin shows a flip chip device (see Figure 5 and column 5, line 15) with a semiconductor chip 12 attached to an interposer board 22. Lin shows the interposer board attached to a PC board with layer of adhesive 36 but does not show a similar attachment between 12 and 22, noting that while it is standard practice (column 2, line 22) it prevents rework. Note that if rework is not as issue, bonding is recommended. Lin also teaches that the thermal coefficient of expansion of the interposer should match that of the die (column 6, line 28). Lin shows vias 24 in the plate 22 with evaporated traces 26 (column 6, line 64) on the plate which connects contacts 16 to vias 24 and solder beads 32 are formed on the surface of 22. Lin shows that the metallization 26 can be evaporated and if performed after forming the hole it will extend into the holes. In addition a conductive fill is used for the vias (column 6, line 66). Lin does not specify the material of the plate 2 but Tsukamoto shows a similar structure where the plate is a glass ceramic which will match the TCE of the die. Igarashi et al. show the use of polyimide to bond the die to the intermediate sheet. It would have been obvious to modify the device of Lin to include the glass ceramic plate taught by Tsukamoto to match the TCE of the die and plate and to use the polyimide bond taught by Igarashi et al. to have a known bonding material. It would have been obvious to use the Lin, Tsukamoto and Igarashi et al. technique on the Kata structure to provide a more robust interconnect structure. Kata et al. do not disclose the material of pads 11 but since Al is used for the interconnect layer

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60 and since Al is a well known connection material for Si, it would have been obvious to use Al for the pads. Note the upper metal layer of Kata et al. is Au.

10. With respect to claims 24, 31 and 38, since Lin shows that the vias can be filled by screen printing, it would have been obvious to use a conductive polymer as a design alternative since it lends itself to such a process.


Conclusions

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas A Wille whose telephone number is (703) 308-4949. The examiner can normally be reached on M-F (6:15-3:45).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

DAW /s/
November 16, 2000


Olik Chaudhuri
Supervisory Patent Examiner